



ORIGINS OF SOCKEYE SALMON (Oncorhynchus nerka) IN THE
LYNN CANAL DRIFT GILLNET FISHERY OF 1981 BASED ON
SCALE PATTERN ANALYSIS

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April 1982

ADF&G TECHNICAL DATA REPORTS

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The primary purpose of these reports is presentation of data. Description of programs and data collection methods is included only to the extent required for interpretation of the data. Analysis is generally limited to that necessary for clarification of data collection methods and interpretation of the basic data. No attempt is made in these reports to present analysis of the data relative to its ultimate or intended use.

Data presented in these reports is intended to be final, however, some revisions may occasionally be necessary. Minor revision will be made via errata sheets. Major revisions will be made in the form of revised reports.

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Division of Commercial Fisheries

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ABSTRACT

Linear discriminant function analysis of scale patterns of age 1.3 sockeye salmon (*Oncorhynchus nerka*) and age composition data obtained from the escapements and commercial catches in Lynn Canal (District 15), Southeastern Alaska provided the basis for apportioning the catch into its component runs of Chilkat and Chilkoot Lakes. The total return of sockeye salmon to Lynn Canal in 1981 was 260,784 of which 93,323 were harvested and 167,461 escaped to spawn. The return of sockeye salmon of Chilkat Lake origin was 133,045 of which 48,956 (36.8%) were harvested and 84,089 escaped to spawn. The return of sockeye salmon of Chilkoot Lake origin was 127,739 of which 44,367 (34.9%) were harvested and 83,372 escaped to spawn.

INTRODUCTION

The District 15 drift gillnet fishery operates in those waters of Lynn Canal, Southeast Alaska north of Little Island (Figure 1). While all five species of Pacific salmon (*Oncorhynchus* sp.) are harvested, the fleet targets on sockeye salmon (*O. nerka*) from June through late August. During the period 1970 to 1980 the fishery harvested between 18,388 and 193,701 each year. The average annual harvest for this same period was 112,808. Sockeye salmon harvested in Lynn Canal originate from the Chilkoot Lake and Chilkat Lake systems. The geography of Lynn Canal coupled with similar migratory timing of these two runs results in a mixed stock fishery.

Estimation of the numbers of fish harvested by run is essential to sound management. Catch apportionment of the run coupled with escapement counts provide estimates of total return by brood year. Total return estimates can subsequently be used to model spawner-recruit relationships, to estimate optimum escapement requirements, and to forecast run size.

The purpose of this report is to provide estimates of the catch, escapement, and total return by age class for the sockeye salmon returning to the Chilkat and Chilkoot Lake systems in 1981. Previous studies by Bergander (1974) demonstrated the feasibility of identifying Chilkat and Chilkoot sockeye salmon using circuli counts and size of the freshwater zone in a dichotomous key. We used a combination of linear discriminant function analysis of scale patterns and age composition data to estimate the contribution of each run to the catch.

METHODS

Numbers of Fish

Catch statistics reported in this paper were obtained from preliminary data on the harvest of sockeye salmon in District 15 as of 11 December 1981.

Estimates of the escapement to each river were obtained by visually counting the number of fish through weirs. The Chilkat River weir operated from 12 June through 22 October. During the period 6-9 September silt laden Tserku River flood water entered the Chilkat Lake slough and prevented counting. We believe that the migration was at a very low level during this period and estimated that approximately 150 fish per day may have entered the lake uncounted. The Chilkoot River weir was in operation from 10 June through 6 September. Flooding waters during the period 21-22 August resulted in no counts. For this 2 day period we estimated the migration based upon the average of the counts made on the two preceding and following days.

Age Composition

Examination of scale samples provide age information of fish in the catch and escapement. Samples were collected on the left side of the fish approximately two rows above the lateral line and on the diagonal row downward from the

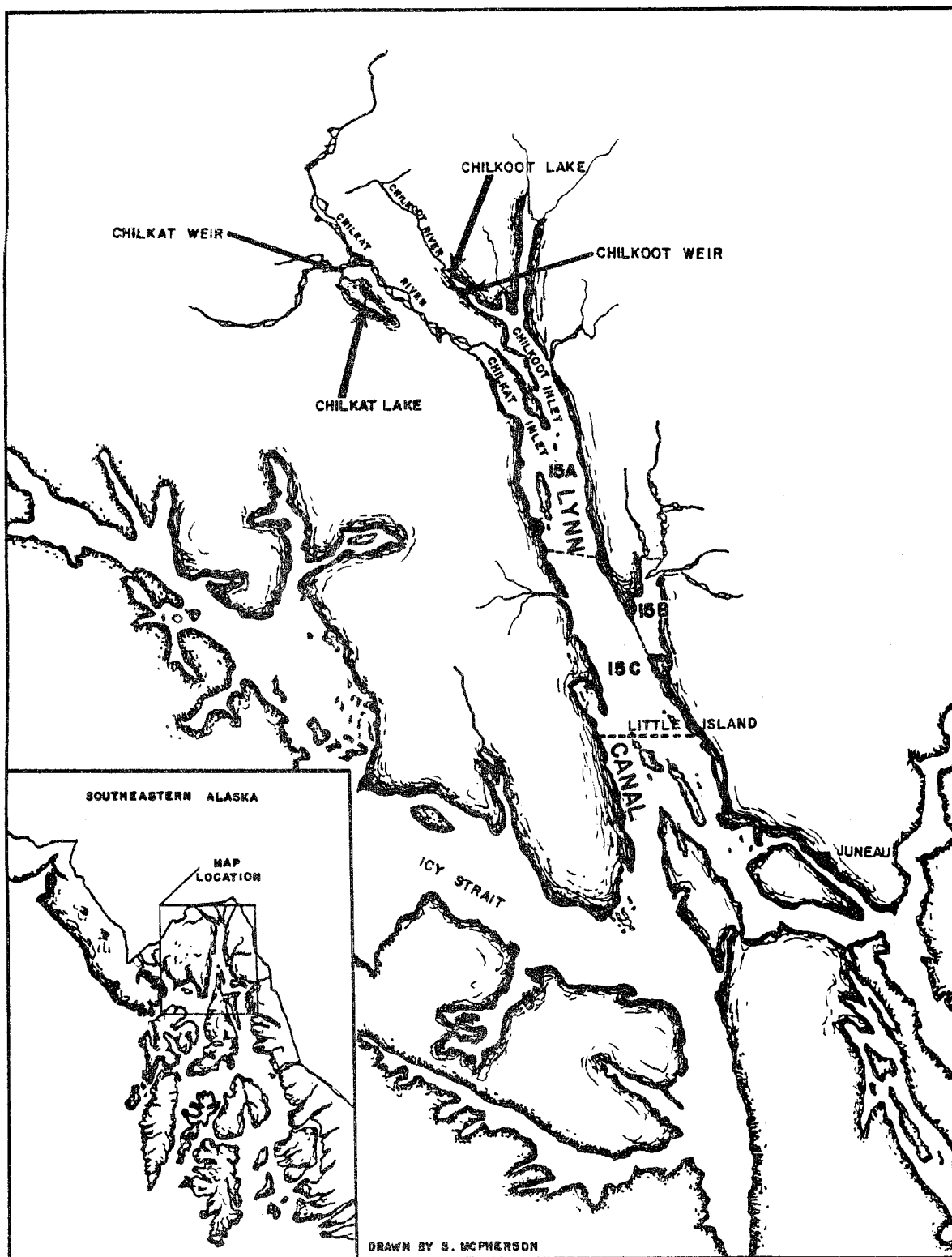


Figure 1. Map of Lynn Canal with inset of Southeastern Alaska.

posterior insertion of the dorsal fin (I.N.P.F.C. 1961). Scales were mounted on gum cards and impressions were made in cellulose acetate (Clutter and Whitesel 1956). Ages were recorded in European¹ notation.

Scale samples were collected from the commercial catch for each fishing period from 15 June through 2 September and an age composition was computed for each. Catches made after this date were small and did not justify the cost of sampling. We, therefore, assigned the same age composition to catches made after 2 September as was computed for the period 31 August - 2 September.

Scale samples were collected from fish captured at the Chilkat and Chilkoot River weirs by dipnetting and with fyke traps positioned on the upstream side of the weirs. Data collected on a daily basis was pooled with two objectives in mind. Firstly, a minimum sample of approximately 300 was desired and secondly we hoped to split the available samples into at least three time periods. Sufficient samples were available to accomplish these objectives for the Chilkoot River but, unfortunately, no samples were available for the Chilkat River after 2 September and a significant portion of the escapement occurred after this date.

Stock Identification

Estimates of the contribution of the Chilkat and Chilkoot River runs to the commercial catch were made using linear discriminant function analysis of scale patterns and age composition data. Because of the dominance of age 1.3 fish we limited our scale pattern analysis to this age class.

Scale Measurements:

Scale impressions were magnified to 100 power and projected onto a digitizing tablet using equipment similar to that described by Ryan and Christie (1976). Data was recorded onto computer diskettes from the digitizer tablet under the control of a FORTRAN program executing on a microcomputer. Measurements were taken along an axis approximately 20 degrees off the primary scale axis; this axis is perpendicular to the sculptured field. We measured the distance between each circulus in each of three scale pattern zones. The zones were: (1) scale focus to the outside edge of the freshwater annulus; (2) outside edge of the freshwater annulus to the last circulus of plus growth; and (3) the last circulus of the plus growth zone to the outer edge of the first ocean annulus (Figure 2). A set of 11 variables was then computed for each of these three zones (Table 1).

Analytical Procedures:

Linear discriminant function analysis (Fisher 1936; Dixon and Brown 1979) of scale pattern data was used to identify the origin of sockeye salmon harvested

¹ European formula: Numerals preceding the decimal refer to the number of freshwater annuli, numerals following the decimal are the number of marine annuli. Total age is the sum of these two numbers plus 1.

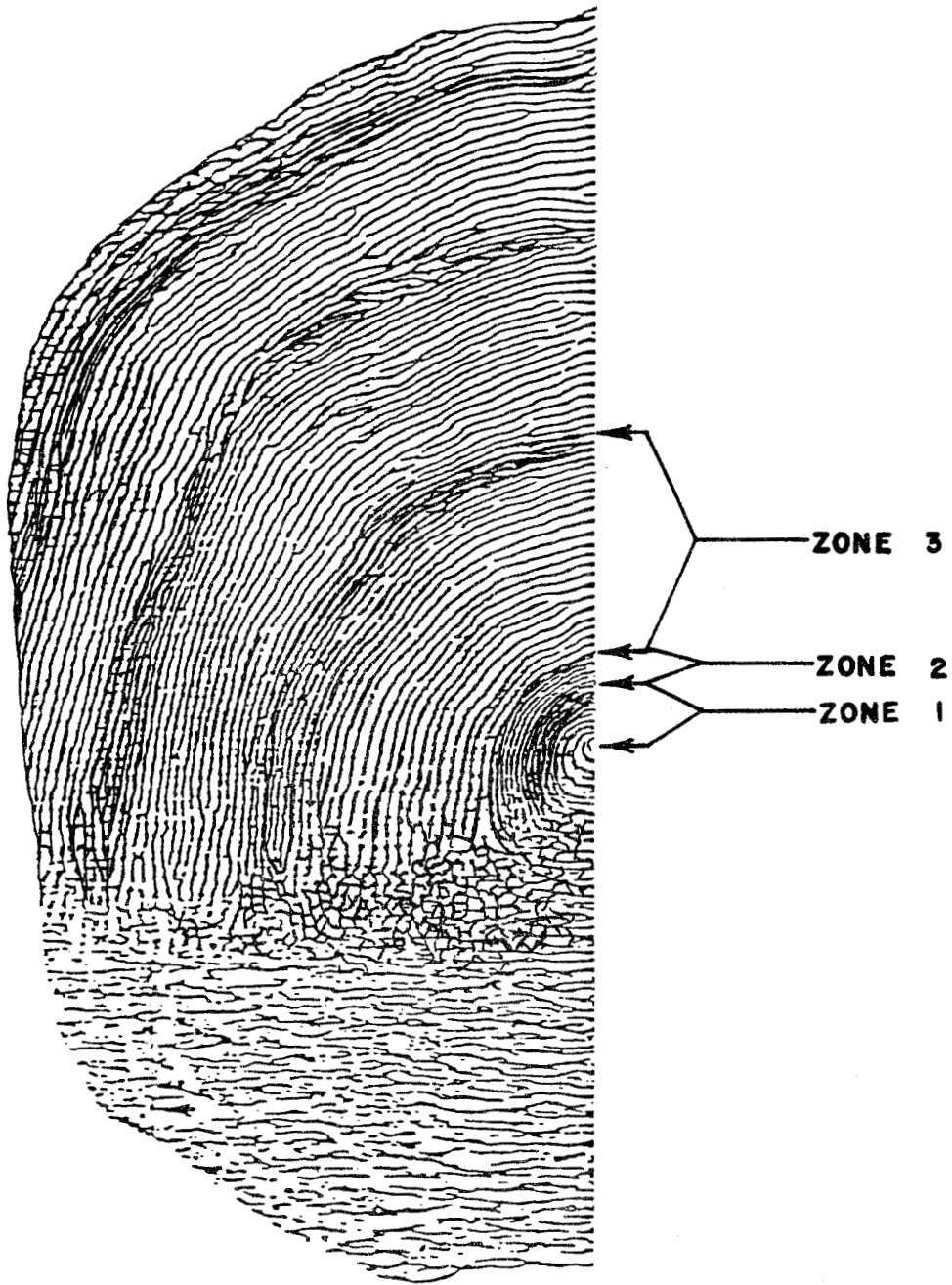


Figure 2. Photograph of a sockeye salmon scale showing the three zones measured.

Table 1. Variables computed from scale patterns for inclusion in the linear discriminant function analysis.

Variable Name	Description
NC(i) ¹	Number of circuli in zone (i).
ID(i)	Measured size of zone (i).
TWO(i)	Distance from the beginning of zone i to the second circulus of zone (i).
FOUR(i)	Distance from the beginning of zone i to the fourth circulus of zone (i).
SIX(i)	Distance from the beginning of zone i to the sixth circulus of zone (i).
EIGHT(i)	Distance from the beginning of zone i to the eighth circulus of zone (i).
MIN(i)	Distance between the two closest circuli in zone (i).
MAX(i)	The maximum distance between two contiguous circuli in zone (i).
LMIN(i)	The distance from the beginning of the zone (i) to the first circulus of variable MIN(i) in zone (i).
LMAX(i)	The distance from the beginning of zone (i) to the first circulus of variable MAX(i) in zone (i).
NCH(i)	The number of circuli in the first half of zone (i).

¹ Where i = 1,2,3.

in the fishery. We constructed the discriminant function with scale pattern data collected from fish in the escapements to each of the respective river's in previous years because of our need to determine the origins of fish harvested on an in-season basis and because of the long delay between the fishery and the availability of escapement samples from Chilkat River fish. We evaluated this procedure with samples collected from the current year when the samples became available. Because there was no significant difference we did not reclassify the fishery samples with a year specific model.

Selection of a subset of the 33 characters for inclusion in the discriminant model was made by offering all variables to the stepwise procedure described by Dixon and Brown (1979) with an F level for inclusion set at 4.0. We then compared the accuracy of the models generated at each step in the analysis and when inclusion of additional variables failed to produce increased accuracy we ignored their use in subsequent analysis.

Estimates of the proportion of age 1.3 fish originating from the Chilkat and Chilkooot Rivers was made by classifying scale pattern data obtained from a sample of the commercial catch during each fishing period. Point estimates were corrected for misclassification error rates using the procedure of Cook and Lord (1978). The variance and 90% confidence intervals for these estimates was computed using the procedures of Pella and Robertson (1979).

Estimates of the proportion of other age classes in the fishery originating from the two rivers was made using the age 1.3 estimates and the ratio of age 1.3 fish in the escapements to the other age classes using the formula:

$$\hat{s}_{ij} = \frac{(\hat{C}_{i1.3}) (\hat{E}_{ij} / \hat{E}_{i1.3})}{\sum_{i=1}^2 (\hat{C}_{i1.3}) (\hat{E}_{ij} / \hat{E}_{i1.3})}$$

Where:

\hat{s}_{ij} = Estimated proportion of stock i in the harvest of age j .

$\hat{C}_{i1.3}$ = Estimated proportion of stock i in the harvest of age 1.3 fish.

\hat{E}_{ij} = Estimated proportion of age j fish in stock i 's escapement.

$\hat{E}_{i1.3}$ = Estimated proportion of age 1.3 fish in stock i 's escapement.

RESULTS

Numbers of Fish

The total harvest of sockeye salmon in the Lynn Canal (District 15) area was 93,323 (Table 2). The harvest occurred over a 15-week period beginning 15 June and lasting through 26 September. The harvest exhibited a bimodal pattern with modes occurring during the last half of July and the end of August. Management strategies to selectively harvest or protect stocks of sockeye, pink (*O. gorbuscha*), chum (*O. keta*), or coho (*O. kisutch*) salmon produced considerable weekly variation in the time, areas, and gear permitted. These regulatory measures are summarized as footnotes to Table 2.

The total escapement into Chilkat Lake was estimated to be 84,089 fish (Table 3). Significant numbers of fish were first seen on 8 July but counts remained low through August. By the end of August only 9.3% of the escapement had passed the weir. A brief surge of fish during the first 5 days of September accounted for 21,216 fish, or 25.2% of the escapement. Low counts during the middle of September may have resulted from flooding Tsirku River water spilling over into the Chilkat River slough. On 22 September the cumulative escapement was 32,048 fish, or 38.1% of the total. The majority (52,514 or 61.8%) of the escapement occurred during the period 23 September through 12 October. Escapement counts remained low through 22 October when the weir was removed.

The total escapement into Chilkoot Lake was estimated to be 83,372 fish (Table 4). Counts were fairly low and erratic from 10 June through 11 July. During this first 30 days of operation, 4,548 fish were counted and this represented only 5.5% of the total. Counts remained fairly stable from 12 July through the end of August. Two weakly defined modes were evident in the escapement counts, however, one on 17 July and another during the end of the first week of August.

The mean serial dates of the Chilkoot River and Chilkat River escapements were 212.7 (1 August) and 260.1 (17 September), respectively (Figure 3). The variance of the escapement counts shows that the Chilkat River escapement was more protracted than the escapement into the Chilkoot River (319.4 vs 285.7).

Age Composition

This section summarizes the age composition of the commercial catch and the escapement. Significant differences were evident in the escapement age composition data which by itself provides insight into the stock composition of the catch.

Escapement:

The Chilkoot River data was divided into four time periods and little difference is evident between these periods (Table 5). Age 1.3 fish dominated the escapement accounting for 82.3% to 88.2% of the samples. Age 1.2 fish accounted for between 8.8% and 15.7% of the samples. Fish of other age classes were extremely rare. Samples collected during the period 11 June through 24 July

Table 2. Harvest of sockeye salmon in Lynn Canal (District 15) by period, 1981.

Section	Statistical Week	Period	Hours (H)	Boats (B)	Mesh ¹⁶ Size	Catch ¹⁷
15-A ¹	25	6/15-18	72	61	5-1/2	3,968
15-A ¹	26	6/22-25	72	72	5-1/2	4,139
15-A	27	6/29-7/1	48	66	5-1/2	3,716
15-A ²	28	7/6-8	48	59	5-1/2	4,384
15-A&C ³	29	7/13-15	48 ⁴	70	5-1/2	12,149
15-A&C ³	30	7/20-22	48	98	5-1/2	13,375
15-A&C ⁵	31	7/27-29	24 ⁶	91	5-1/2	13,954
15-AB&C ⁷	32	8/3-5	24 ⁸	114	5-1/2	7,900
15-A ⁹	33	8/10	12	80	5-1/2	2,595
15-A&C ¹⁰	34	8/17-18	12 ¹¹	88	5-1/2	2,946
15-A&C ¹²	35	8/24-26	48 ¹²	114	5-1/2	19,259
15-A&C ¹³	36	8/31-9/2	48	196	6-1/4 minimum	3,362
15-A&C ¹⁴	37	9/7-9/9	48	183	6-1/4 minimum	1,121
15-A ¹⁵	38	9/14-15	24	139	6-1/4 minimum	358
15-A ¹⁵	39	9/21-22	12	127	6-1/4 minimum	97
Total						93,323

¹ Chilkat Inlet closed north of the latitude of Seduction Point. Chilkoot Inlet closed north of the latitude of Katzechin Flats buoy.

² Open only south of the latitude of the southernmost tip of Seduction Point.

³ Section 15-A open south of latitude of the southernmost tip of Seduction Point. Section 15-C open within 2 nautical miles of the western shore.

⁴ Section 15-A open initially for 24 hours, 15-C for 48 hours.
Section 15-A extended for an additional 24 hours.
Section 15-C extended for an additional 24 hours. (Total = 72 hours)

⁵ 15-A open in waters south of the latitude of the southernmost tip of Talsani Island and those waters north of the latitude of the Katzechin flats buoy 15-C open within 2 nautical miles of the western shoreline of the section.

(Continued)

Table 2. Harvest of sockeye salmon in Lynn Canal (District 15) by period, 1981 (continued).

- ⁶ Section 15-C open for 48 hours.
- ⁷ Section 15-A open in waters south of the latitude of the southernmost tip of Talsani Island, section 15-B open, section 15-C within 2 nautical miles of the western shore.
- ⁸ 24 hours in section 15-A, 48 hours in sections 15-B and 15-C.
- ⁹ Section 15-A open south of the latitude of the southernmost tip of Talsani Island to Eldred Rock Light and north of the latitude of Eldred Rock Light and in the waters of Chilkoot Inlet north of the latitude of the Katzehin Flats buoy.
- ¹⁰ Section 15-A open south of the latitude of the southernmost tip of Talsani Island and east of a line from the southernmost tip of Talsani Island to Eldred Rock Light to the western shore of section 15-A at the latitude of Sherman Rock Light. Section 15-C, open.
- ¹¹ Section 15-A 12 hours, Section 15-C 24 hours.
- ¹² Section 15-A Chilkoot Inlet open north of the latitude of the Katzehin Flats buoy (12 hours), south of the latitude of the southernmost tip of Talsani Island will be open for 48 hours.
- ¹³ Chilkat Inlet north of the latitude of the Glacier Point marker is closed.
- ¹⁴ Section 15-C open only south of the latitude of the northernmost tip of Point Bridget.
- ¹⁵ Section 15-C Chilkat Inlet north of the latitude of the southernmost tip of Seduction Point is closed.
- ¹⁶ a) Nets with mesh smaller than 8" may not be deeper than 60 meshes (40 meshes for nets with mesh larger than 8"); b) between 50 and 200 fathoms in length; c) most nets used prior to 31 August were 5-1/2" mesh.
- ¹⁷ Includes ADF&G test fish catches.

Table 3. Daily and cumulative escapement of sockeye salmon past the Chilkat River weir, 1981.

Date	Numbers		Proportion	
	Daily	Cumulative	Daily	Cumulative
June 12	3	3	0.00004	0.00004
13	0	3	0.00000	0.00004
14	0	3	0.00000	0.00004
15	0	3	0.00000	0.00004
16	0	3	0.00000	0.00004
17	0	3	0.00000	0.00004
18	0	3	0.00000	0.00004
19	0	3	0.00000	0.00004
20	0	3	0.00000	0.00004
21	0	3	0.00000	0.00004
22	0	3	0.00000	0.00004
23	0	3	0.00000	0.00004
24	0	3	0.00000	0.00004
25	1	4	0.00001	0.00005
26	1	5	0.00001	0.00006
27	0	5	0.00000	0.00006
28	2	7	0.00002	0.00008
29	0	7	0.00000	0.00008
30	1	8	0.00001	0.00010
July 1	0	8	0.00000	0.00010
2	0	8	0.00000	0.00010
3	0	8	0.00000	0.00010
4	0	8	0.00000	0.00010
5	4	12	0.00005	0.00014
6	8	20	0.00010	0.00024
7	83	103	0.00099	0.00122
8	46	149	0.00055	0.00177
9	103	252	0.00122	0.00300
10	37	289	0.00044	0.00344
11	79	368	0.00094	0.00438
12	78	446	0.00093	0.00530
13	50	496	0.00059	0.00590
14	62	558	0.00074	0.00664
15	140	698	0.00166	0.00830
16	116	814	0.00138	0.00968
17	110	924	0.00131	0.01099
18	131	1,055	0.00156	0.01255
19	335	1,390	0.00398	0.01653
20	116	1,506	0.00138	0.01791
21	26	1,532	0.00031	0.01822
22	237	1,769	0.00282	0.02104
23	417	2,186	0.00496	0.02600
24	258	2,444	0.00307	0.02906
25	55	2,499	0.00065	0.02972
26	5	2,504	0.00006	0.02978
27	204	2,708	0.00243	0.03220
28	10	2,718	0.00012	0.03232
29	53	2,771	0.00063	0.03295
30	48	2,819	0.00057	0.03352
31	0	2,819	0.00000	0.03352
August 1	0	2,819	0.00000	0.03352
2	6	2,825	0.00007	0.03360
3	47	2,872	0.00056	0.03415
4	165	3,037	0.00196	0.03612
5	0	3,037	0.00000	0.03612
6	0	3,037	0.00000	0.03612
7	0	3,037	0.00000	0.03612
8	0	3,037	0.00000	0.03612
9	0	3,037	0.00000	0.03612
10	33	3,070	0.00039	0.03651
11	142	3,212	0.00169	0.03820
12	554	3,766	0.00659	0.04479
13	422	4,188	0.00502	0.04980
14	1,022	5,210	0.01215	0.06196
15	6	5,216	0.00007	0.06203
16	0	5,216	0.00000	0.06203

-Continued-

Table 3. Daily and cumulative escapement of sockeye salmon past the Chilkat River weir, 1981 (continued).

Date	Numbers		Proportion	
	Daily	Cumulative	Daily	Cumulative
17	0	5,216	0.00000	0.06203
18	0	5,216	0.00000	0.06203
19	0	5,216	0.00000	0.06203
20	0	5,216	0.00000	0.06203
21	0	5,216	0.00000	0.06203
22	10	5,226	0.00012	0.06215
23	205	5,431	0.00244	0.06459
24	144	5,575	0.00171	0.06630
25	379	5,954	0.00451	0.07081
26	29	5,983	0.00034	0.07115
27	34	6,017	0.00040	0.07156
28	31	6,048	0.00037	0.07192
29	801	6,849	0.00953	0.08145
30	166	7,015	0.00197	0.08342
31	771	7,786	0.00917	0.09259
September 1	1,300	9,086	0.01546	0.10805
2	1,864	10,950	0.02217	0.13022
3	6,572	17,522	0.07816	0.20837
4	9,343	26,865	0.11111	0.31948
5	2,137	29,002	0.02541	0.34490
6	150	29,152	0.00178	0.34668
7	150	29,302	0.00178	0.34846
8	150	29,452	0.00178	0.35025
9	150	29,602	0.00178	0.35203
10	150	29,752	0.00178	0.35382
11	150	29,902	0.00178	0.35560
12	150	30,052	0.00178	0.35738
13	150	30,202	0.00178	0.35917
14	150	30,352	0.00178	0.36095
15	150	30,502	0.00178	0.36273
16	213	30,715	0.00253	0.36527
17	32	30,747	0.00038	0.36565
18	53	30,800	0.00063	0.36628
19	120	30,920	0.00143	0.36771
20	280	31,200	0.00333	0.37104
21	311	31,511	0.00370	0.37473
22	537	32,048	0.00639	0.38112
23	4,801	36,849	0.05709	0.43821
24	2,751	39,600	0.03272	0.47093
25	7,409	47,009	0.08811	0.55904
26	5,016	52,025	0.05965	0.61869
27	4,281	56,306	0.05091	0.66960
28	8,441	64,747	0.10038	0.76998
29	3,597	68,344	0.04278	0.81276
30	1,021	69,365	0.01214	0.82490
October 1	3,554	72,919	0.04226	0.86716
2	1,660	74,579	0.01974	0.88691
3	0	74,579	0.00000	0.88691
4	0	74,579	0.00000	0.88691
5	1,940	76,519	0.02307	0.90998
6	844	77,363	0.01004	0.92001
7	2,224	79,587	0.02645	0.94646
8	324	79,911	0.00385	0.95031
9	2,244	82,155	0.02669	0.97700
10	612	82,767	0.00728	0.98428
11	1,058	83,825	0.01258	0.99686
12	200	84,025	0.00238	0.99924
13	0	84,025	0.00000	0.99924
14	0	84,025	0.00000	0.99924
15	0	84,025	0.00000	0.99924
16	0	84,025	0.00000	0.99924
17	35	84,060	0.00042	0.99966
18	0	84,060	0.00000	0.99966
19	14	84,074	0.00017	0.99982
20	0	84,074	0.00000	0.99982
21	0	84,074	0.00000	0.99982
22	15	84,089	0.00018	1.00000

Table 4. Daily and cumulative escapement of sockeye salmon past the Chilkoot River weir, 1981.

Date	Numbers		Proportion	
	Daily	Cumulative	Daily	Cumulative
June 10	25	25	0.00030	0.00030
11	21	46	0.00025	0.00055
12	77	123	0.00092	0.00148
13	83	206	0.00100	0.00247
14	322	528	0.00386	0.00633
15	19	547	0.00023	0.00656
16	243	790	0.00291	0.00948
17	343	1,133	0.00411	0.01359
18	1,032	2,165	0.01238	0.02597
19	181	2,346	0.00217	0.02814
20	166	2,512	0.00199	0.03013
21	135	2,647	0.00162	0.03175
22	105	2,752	0.00126	0.03301
23	78	2,830	0.00094	0.03394
24	480	3,310	0.00576	0.03970
25	145	3,455	0.00174	0.04144
26	167	3,622	0.00200	0.04344
27	5	3,627	0.00006	0.04350
28	108	3,735	0.00130	0.04480
29	0	3,735	0.00000	0.04480
30	20	3,755	0.00024	0.04504
July 1	114	3,869	0.00137	0.04641
2	16	3,885	0.00019	0.04660
3	58	3,943	0.00070	0.04729
4	16	3,959	0.00019	0.04749
5	252	4,211	0.00302	0.05051
6	171	4,382	0.00205	0.05256
7	63	4,445	0.00076	0.05332
8	30	4,475	0.00036	0.05368
9	19	4,494	0.00023	0.05390
10	6	4,500	0.00007	0.05397
11	48	4,548	0.00058	0.05455
12	1,175	5,723	0.01409	0.06864
13	2,464	8,187	0.02955	0.09820
14	2,573	10,760	0.03086	0.12906
15	1,061	11,821	0.01273	0.14179
16	1,156	12,977	0.01387	0.15565
17	5,286	18,263	0.06340	0.21905
18	2,858	21,121	0.03428	0.25333
19	1,344	22,465	0.01612	0.26945
20	1,035	23,500	0.01241	0.28187
21	3,734	27,234	0.04479	0.32666
22	538	27,772	0.00645	0.33311
23	1,089	28,861	0.01306	0.34617
24	2,735	31,596	0.03280	0.37898
25	1,740	33,336	0.02087	0.39985
26	1,204	34,540	0.01444	0.41429
27	525	35,065	0.00630	0.42058
28	1,127	36,192	0.01352	0.43410
29	586	36,778	0.00703	0.44113
30	789	37,567	0.00946	0.45059
31	700	38,267	0.00840	0.45899
August 1	700	38,967	0.00840	0.46739
2	574	39,541	0.00688	0.47427
3	1,523	41,064	0.01827	0.49254
4	2,526	43,590	0.03030	0.52284
5	3,151	46,741	0.03779	0.56063
6	1,852	48,593	0.02221	0.58285
7	3,322	51,915	0.03985	0.62269
8	3,007	54,922	0.03607	0.65876
9	2,006	56,928	0.02406	0.68282
10	1,552	58,480	0.01862	0.70143
11	1,238	59,718	0.01485	0.71628
12	2,654	62,372	0.03183	0.74812
13	790	63,162	0.00948	0.75759

-Continued-

Table 4. Daily and cumulative escapement of sockeye salmon past the Chilkoot River weir, 1981 (continued).

Date	Numbers		Proportion	
	Daily	Cumulative	Daily	Cumulative
14	2,855	66,017	0.03424	0.79184
15	1,396	67,413	0.01674	0.80858
16	955	68,368	0.01145	0.82004
17	2,083	70,451	0.02498	0.84502
18	1,060	71,511	0.01271	0.85773
19	1,520	73,031	0.01823	0.87597
20	570	73,601	0.00684	0.88280
21	793	74,394	0.00951	0.89231
22	793	75,187	0.00951	0.90183
23	275	75,462	0.00330	0.90512
24	808	76,270	0.00969	0.91482
25	877	77,147	0.01052	0.92533
26	912	78,059	0.01094	0.93627
27	1,399	79,458	0.01678	0.95305
28	817	80,275	0.00980	0.96285
29	658	80,933	0.00789	0.97075
30	459	81,392	0.00551	0.97625
31	629	82,021	0.00754	0.98380
September 1	281	82,302	0.00337	0.98717
2	276	82,578	0.00331	0.99048
3	370	82,948	0.00444	0.99491
4	242	83,190	0.00290	0.99782
5	148	83,372	0.00178	0.99959
6	34	83,372	0.00041	1.00000

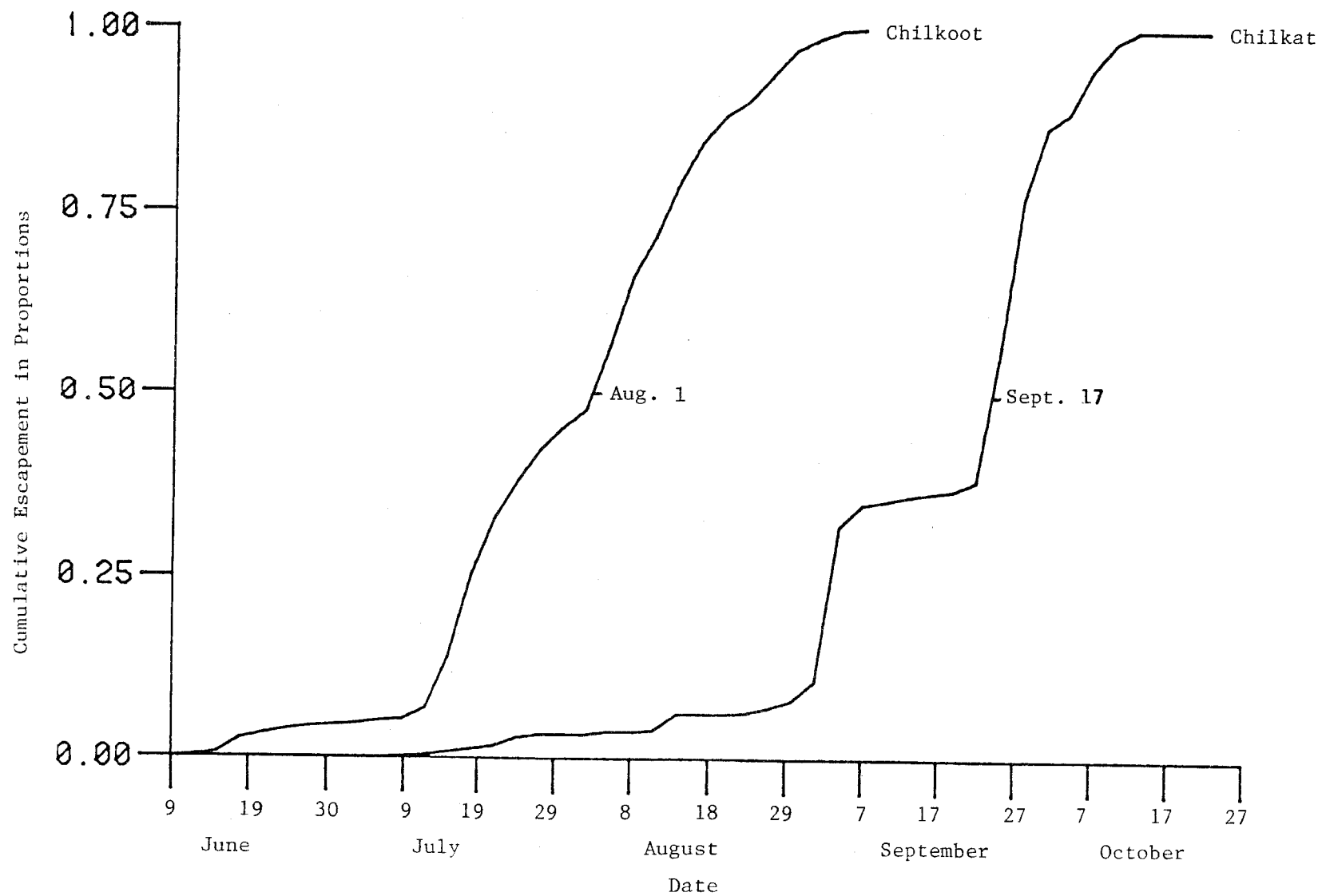


Figure 3. Cumulative daily escapement of sockeye salmon through the Chilkoot and Chilkat River weirs, 1981.

Table 5. Age and sex composition of sockeye salmon sampled at Chilkoot River weir, by date, 1981.

Date	Age Class																	
	1.2			2.2			1.3			2.3			Other			Total		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
6/11							4	2	6							5	2	7
6/12							15	2	20	1		1				16	2	21
6/13							1	1	2							2	1	3
6/14							2	1	3							3	1	4
6/15							3	1	4							4	1	5
6/16							3	2	5							5	2	7
6/17							3	2	5							5	2	7
6/18							3	2	5							5	2	7
6/19							3	2	5							5	2	7
6/20							3	2	5							5	2	7
6/21							3	2	5							5	2	7
6/22							3	2	5							5	2	7
6/23							3	2	5							5	2	7
6/24							3	2	5							5	2	7
6/25							3	2	5							5	2	7
6/26							3	2	5							5	2	7
6/27							3	2	5							5	2	7
6/28							3	2	5							5	2	7
7/01							3	2	5							5	2	7
7/06							3	2	5							5	2	7
7/09							3	2	5							5	2	7
7/11							3	2	5							5	2	7
7/12							3	2	5							5	2	7
7/13							3	2	5							5	2	7
7/14							3	2	5							5	2	7
7/15							3	2	5							5	2	7
7/16							3	2	5							5	2	7
7/17							3	2	5							5	2	7
7/18							3	2	5							5	2	7
7/19							3	2	5							5	2	7
7/20							3	2	5							5	2	7
7/21							3	2	5							5	2	7
7/22							3	2	5							5	2	7
7/23							3	2	5							5	2	7
7/24							3	2	5							5	2	7
6/11-7/24	30	17	47	0.0	0.0	0.0	152	94	246	100.0	0.0	1.3	50.0	1	0.7	187	112	299
Numbers	63.8	36.2	15.7	0.0	0.0	0.0	61.8	38.2	82.3	100.0	0.0	1.3	50.0	50.0	0.7	62.5	37.5	100.0
Percent																		
7/25	3	3	6				4	5	9							7	8	15
7/26	1	3	4				7	4	11	1		1	1		1	10	7	17
7/27	6	1	7				53	38	91		1	1	1	1	2	60	43	103
7/28	9	1	10				39	46	85	2		2				50	54	104
7/29	4	1	5				18	26	44	1		1				23	27	50
7/25-7/29	23	18	41	0.0	0.0	0.0	121	119	240	80.0	20.0	1.7	66.7	33.3	1.0	150	139	289
Numbers	51.6	43.9	14.2	0.0	0.0	0.0	50.4	49.6	83.0	100.0	20.0	1.7	66.7	33.3	1.0	51.9	48.1	100.0
Percent																		
7/30	1	1	2				14	20	34							15	21	36
8/01	1		1				11	7	18	1		1				12	14	26
8/02		5	5				17	27	44							16	27	43
8/03		2	2				12	15	27							15	20	35
8/04	1		1				16	17	33		1	1				17	18	35
8/05							4	9	13	1		1				5	9	14
8/06	3	4	7				14	12	26							17	16	33
8/07	2		2				21	8	29	2	1	3	2		2	27	10	37
8/08							8	8	16							8	8	16
7/30-8/08	8	19	27	0.0	0.0	0.0	126	144	270	71.5	28.6	2.3	100.0	0.0	0.7	141	165	306
Numbers	29.6	70.4	8.8	0.0	0.0	0.0	46.7	53.3	88.2	100.0	28.6	2.3	100.0	0.0	0.7	46.1	53.9	100.0
Percent																		
8/09	1	3	4				4	8	12		1		1			6	11	17
8/10							12	8	20							13	8	21
8/11	1	3	4				12	18	30							16	23	39
8/12		5	5				12	9	21							16	12	28
8/13							6	11	17							9	16	25
8/14	1		1				15	8	23							16	8	24
8/15							4	14	18							4	14	18
8/16	4		4				8	9	17							16	10	26
8/17	2	1	3				14	8	22							18	9	27
8/18							12	13	25		1	1				12	14	26
8/19	2		2				2	1	3							4	4	8
8/20							1	4	5							1	4	5
8/21							1	4	5							1	4	5
8/22							1	4	5							1	4	5
8/23							1	4	5							1	4	5
8/24							1	4	5							1	4	5
8/25							1	4	5							1	4	5
8/26							1	4	5							1	4	5
8/27							1	4	5							1	4	5
8/28							1	4	5							1	4	5
8/29							1	4	5							1	4	5
8/30							1	4	5							1	4	5
8/09-9/03	16	16	32	0.0	0.0	0.0	119	135	254	33.3	66.7	1.0	0.0	0.0	0.0	136	153	289
Numbers	50.0	50.0	11.1	0.0	0.0	0.0	46.9	53.1	87.9	100.0	66.7	1.0	0.0	0.0	0.0	47.1	52.9	100.0
Percent																		

1. Figures represent the percent of each age class which are males and females, and the percent each age class represents of the total sample for the time period.

indicate a preponderance (62.5%) of males in the samples. While some differences are evident in the sex composition within age classes after this period, the samples as a whole indicate the sexes were represented approximately equally.

The available age composition data for the Chilkat River escapement indicates a much greater diversity than observed for the Chilkoot River fish. Age 1.3 fish accounted for between 42.1% and 61.0% of the samples (Table 6). Age 2.3 fish accounted for a significant percent (26.9 to 44.8) of the samples. Among two-ocean age fish, age 2.2 fish were more common (7.2% to 10.3%) than age 1.2 fish (2.4% to 3.9%). Sex composition of the samples indicates that males composed from 69.5% to 71.4% of the samples. This preponderance of males was seen in each age class.

Estimates of the total number of fish of each age class in the escapements to the Chilkoot and Chilkat Rivers was estimated by applying period age composition estimates to the number of fish passing the weir during those time periods and summing the estimates across all time periods. These data for the Chilkoot River fish (Table 7) indicate that approximately 71,312 fish (85.5%) were age 1.3 and that 10,451 (12.5%) were age 1.2. Only 2% of the escapement was composed of other age classes. Application of age composition data collected during the period 4 August through 2 September to the Chilkat River escapement occurring during the period 3 September through 22 October resulted in significant numbers of fish being assigned to age classes 1.3 and 2.3 because most (87%) of the escapement occurred during this period. The final estimate indicate that ages 1.3 and 2.3 were almost equally represented (35,920 vs 37,173). Age 2.2 accounted for 8,613 fish and age 1.2 for 2,071 fish.

Catch:

The harvest shown in Table 8 was composed mostly of age 1.3 fish (58.6%) followed by age 2.3 fish (26.7%), age 2.2 (10.3%), age 1.2 (3.2%) and other age classes (1.2%). Females were more abundant than males in the catch (55.9% vs 44.1%) and this trend was evident within each principal age class (Table 8). Early in the run, age 1.3 predominated in the catch and accounted for 67.9% to 90.5% of the harvest (Figure 4). The percent of age 1.3 fish fell sharply to 40.6% in the catch of 3-5 August but increased during the following period to 81.9%. The percent of age 1.3 fish fell during the next two periods to 12.8% and remained at that level. The percent of age 2.3 fish in the catch showed a trend opposite of that exhibited by age 1.3 fish. Initially, age 2.3 fish accounted for 4.0% to 23.7% of the catch. The relative abundance of this age class increased significantly in the catch of 3-5 August and subsequently decreased the following period to 11.7%. The percent of the catch composed of age 2.3 fish steadily increased from this low level to 74.7% during the period 31 August - 1 September and thereafter. Age 2.2 fish were relatively scarce until the period of 24-25 August when they accounted for 33.5% of the catch. Age 1.2 fish were very scarce in all catches, their contribution ranged from 0.6% to 6.4%.

Stock Identification

In this section we summarize the data pertinent to estimating final stock composition of the commercial catch. Estimates of classification accuracy and

Table 6. Age and sex composition of sockeye salmon sampled at Chilkat River weir, by date, 1981.

Date	Age Class																	
	1.2			2.2			1.3			2.3			Other			Total		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
7/05							1		1		1	1				1	1	2
7/06					1	1	1		2		2					1	1	2
7/07					1	1	2		2							3	1	4
7/12																		
7/14				1		1	3	1	4	5	1	6	1		1	1	1	1
7/15										1		1				1	1	1
7/16							2		2							1	1	1
7/18	1	1	2	1		1	6	2	8	2	4	6				10	0	10
7/19				3		3	13	10	23	3		3	1		1	20	15	35
7/20				3		3	8	1	9	6		7				17	2	19
7/21				1		1	13	1	14	5		6				19	2	21
7/22							5	3	8	1		1				6	3	9
7/23				2		2	3		3	1		1				4	0	4
7/24	1		1				6	1	7	1		1				7	1	8
7/25							6		6	1	1	2				8	1	9
7/26							1	2	3							2	2	4
7/27	2	1	3	1		1	16	3	19	3	4	7	1		1	22	6	28
7/28							6	1	7	2		2				8	1	9
7/29		3	3	2	1	3	16	7	23	7	5	12				25	16	41
7/30	1		1	1	1	2	9	14	23	4	2	6				15	17	32
8/02	1		1				2	1	3	1		1				4	1	5
8/03	1		1	1	2	3	16	4	20	6	6	12				24	12	36
7/05-8/03	7	5	12	16	6	22	135	51	186	51	31	82	3	0	3	212	93	305
Numbers	58.3	41.7	3.9	72.7	27.3	7.2	72.6	27.4	61.0	62.2	37.8	26.9	100.0	0.0	1.0	69.5	30.5	100.0
Percent																		
8/04							7	4	11	2	1	3				9	5	14
8/10							1		1							1	0	1
8/11							4	4	8	1	1	2				5	5	10
8/12	2	1	3	2	3	5	16	4	20	4	2	6				24	10	34
8/13				2		2	23	12	35	10	6	16				37	18	55
8/14	2		2	1		1	3	2	5	3	3	6				7	5	12
8/15																1	1	2
8/20							1		1	1	1	1				2	2	4
8/22					1	6	1	0	1	1		1				6	2	8
8/23				5					1							1	0	1
8/24							1		1							1	0	1
8/24				2		2	6	4	10	10	3	13				18	4	22
8/07							1		1	1		2				2	1	3
8/28	1		1	2	0	4	2	1	3	14	4	18	1		1	20	7	27
8/29		1	1	4	2	6	4	2	6	9	2	11				27	7	34
8/31							2	1	3	10	1	11				12	2	14
9/02				1		1	6	2	8	14	1	15				21	2	23
8/04-9/02	5	2	7	20	10	30	82	40	122	89	31	120	1	0	1	207	83	290
Numbers	71.4	28.6	2.4	66.7	33.3	10.3	67.2	32.8	42.1	76.1	23.9	44.8	100.0	0.0	0.3	71.4	28.6	100.0
Percent																		

- Figures represent the percent of each age class which are males and females, and the percent each age class represents of the total sample for the time period.

Table 7. Age composition of sockeye salmon in the escapement to Chilkat and Chilkoot Lakes, by period, 1981.

System	Period	Sample Size		1.2	2.2	Age Class 1.3	2.3	Other	Total
Chilkat	6/12-8/3	305	Number	113	207	1,752	772	28	2,872
			Percent	3.9	7.2	61.0	26.9	1.0	100.0
	8/4-9/2	290	Number	195	836	3,398	3,621	28	8,078
			Percent	2.4	10.4	42.1	44.8	0.4	100.0
	9/3-10/22 ¹	0	Number	1,763	7,570	30,770	32,780	256	73,139
			Percent	2.4	10.4	42.1	44.8	0.4	100.0
	Total	595	Number	2,071	8,613	35,920	37,173	312	84,089
			Percent	2.5	10.2	42.7	44.2	0.4	100.0
Chilkoot	6/11-7/24	299	Number	4,967	0	25,994	423	212	31,596
			Percent	15.7	0.0	82.3	1.3	0.7	100.0
	7/25-7/29	289	Number	735	0	4,303	90	54	5,182
			Percent	14.2	0.0	83.0	1.7	1.0	100.0
	7/30-8/8	306	Number	1,600	0	16,010	416	118	18,144
			Percent	8.8	0.0	88.2	2.3	0.7	100.0
	8/9-9/6	289	Number	3,149	0	25,005	296	0	28,450
			Percent	11.1	0.0	87.9	1.0	0.0	100.0
	Total	1,183	Number	10,451	0	71,312	1,225	384	83,372
			Percent	12.5	0.0	85.5	1.5	0.5	100.0

1. No samples taken, age composition for period 8/4-9/2 used.

Table 8. Age and sex composition of sockeye salmon sampled from the commercial catch¹ in Lynn Canal (District 15), by period, 1981.

Period	1.2			2.2			1.3			2.3			Other			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
6/15-6/18 (N=220)																		
Numbers	53	18	71			0	1,408	2,183	3,591	126	180	306			0	1,587	2,381	3,968
Percent ²	75.0	25.0	1.8			0	39.2	60.8	90.5	41.2	58.8	7.7			0	40.0	60.0	100.0
6/22-6/25 (N=342)																		
Numbers	36	59	95	25	12	37	1,381	1,695	3,076	424	507	931			0	1,863	2,276	4,139
Percent	37.5	62.5	2.3	66.7	33.3	0.9	44.9	55.1	74.3	45.5	54.5	22.5			0	45.0	55.0	100.0
6/29-7/1 (N=236)																		
Numbers	190	48	238		15	15	1,962	561	2,523	519	362	881	44	15	59	1,858	1,858	3,716
Percent	80.0	20.0	6.4	0.0	100.0	0.4	77.8	22.2	67.9	58.9	41.1	23.7	75.0	25.0	1.6	50.0	50.0	100.0
7/6-7/8 (N=231)																		
Numbers	250	39	289	39	53	92	1,498	1,975	3,473	212	213	425	39	66	105	2,039	2,345	4,384
Percent	86.4	13.6	6.6	42.9	57.1	2.1	43.1	56.9	79.2	50.0	50.0	9.7	37.5	62.5	2.4	46.5	53.5	100.0
7/13-7/15 (N=322)																		
Numbers	73	0	73	73	36	109	5,366	5,593	10,959	339	414	753	146	109	255	5,999	6,150	12,149
Percent	100.0	0	0.6	66.7	33.3	0.9	49.0	51.0	90.2	45.0	55.0	6.2	57.1	42.9	2.1	49.4	50.6	100.0
7/20-7/22 (N=341)																		
Numbers	315	394	709	395	434	829	3,251	6,540	9,791	865	1,061	1,926	40	80	120	4,869	8,506	13,375
Percent	44.4	55.6	5.3	47.6	52.4	6.2	33.2	66.8	73.2	44.9	55.1	14.4	33.3	66.7	0.9	36.4	63.6	100.0
7/27-7/29 (N=346)																		
Numbers	202	970	1,172	0	84	84	3,995	7,894	11,889	199	359	558	84	167	251	4,840	9,114	13,954
Percent	17.2	82.8	8.4	0	100.0	0.6	36.6	63.4	85.2	35.7	64.3	4.0	33.3	66.7	1.8	34.7	65.3	100.0

-Continued-

Table 8. Age and sex composition of sockeye salmon sampled from the commercial catch¹ in Lynn Canal (District 15), by period, 1981 (continued).

Period	1.2			2.2			1.3			2.3			Other			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
8/3-8/5 (N=347)																		
Numbers	47	24	71	478	478	956	1,774	1,433	3,207	1,730	1,889	3,619	23	24	47	4,052	3,848	7,900
Percent	66.7	33.3	0.9	50.0	50.0	12.1	55.3	44.7	40.6	47.8	52.2	45.8	50.0	50.0	0.6	51.3	48.7	100.0
8/10 (N=151)																		
Numbers	33	16	49	33	84	117	944	1,181	2,125	169	135	304			0	1,178	1,417	2,595
Percent	66.7	33.3	1.9	28.6	71.4	4.5	44.4	55.6	81.9	55.6	44.3	11.7			0	45.4	54.5	100.0
8/17-8/18 (N=173)																		
Numbers	18	17	35	203	204	407	494	546	1,040	851	545	1,396	51	17	68	1,617	1,329	2,946
Percent	50.0	50.0	1.2	50.0	50.0	13.8	47.5	52.5	35.3	61.0	39.0	47.4	75.0	25.0	2.3	54.9	45.1	100.0
8/24-8/26 (N=343)																		
Numbers	58	115	173	2,974	3,478	6,452	1,062	1,288	2,350	4,101	6,010	10,111	173	0	173	8,358	10,901	19,259
Percent	33.3	66.7	0.9	46.1	53.9	33.5	45.2	54.8	12.2	40.6	59.4	52.5	100.0	0	0.9	43.4	56.6	100.0
8/31-9/1 (N=257)																		
Numbers	0	27	27	209	151	366	182	248	430	1,557	955	2,512	27	0	27	1,973	1,389	3,362
Percent	0.0	100.0	0.8	57.1	42.9	10.9	42.4	57.5	12.8	62.0	38.0	74.7	100.0	0	0.8	58.7	41.3	100.0
9/7-9/9 ³																		
Numbers	0	9	9	70	52	122	61	82	143	520	318	838	9	0	9	658	463	1,121
Percent	0	100.0	0.8	57.1	42.9	10.9	42.4	57.5	12.8	62.0	38.0	74.7	100.0	0	0.8	58.7	41.3	100.0
9/14-9/15 ³																		
Numbers	0	3	3	22	17	39	20	26	46	166	101	267	3	0	3	210	148	358
Percents	0	100.0	0.8	57.1	42.9	10.9	42.4	57.5	12.8	62.0	38.0	74.7	100.0	0	0.8	58.7	41.3	100.0
9/21-9/22 ³																		
Numbers	0	1	1	6	5	11	5	7	12	45	27	72	1	0	1	57	40	97
Percent	0	100.0	0.8	57.1	42.9	10.9	42.4	57.5	12.8	62.0	38.0	74.7	100.0	0	0.8	58.7	41.3	100.0
Total																		
Numbers	1,275	1,740	3,015	4,527	5,109	9,636	24,403	31,252	54,655	11,823	13,076	24,899	640	478	1,118	41,158	52,165	93,323
Percent	42.3	57.7	3.2	47.0	53.0	10.3	42.8	57.2	58.6	47.5	52.5	26.7	57.2	42.8	1.2	44.1	55.9	100.0

¹ Includes ADF&G test fishing catch samples.

² Percent figures for sexes are within each age class, percent figures for the total of an age class are for the entire sample.

³ No samples collected, age composition estimated from samples collected on 8/31-9/1.

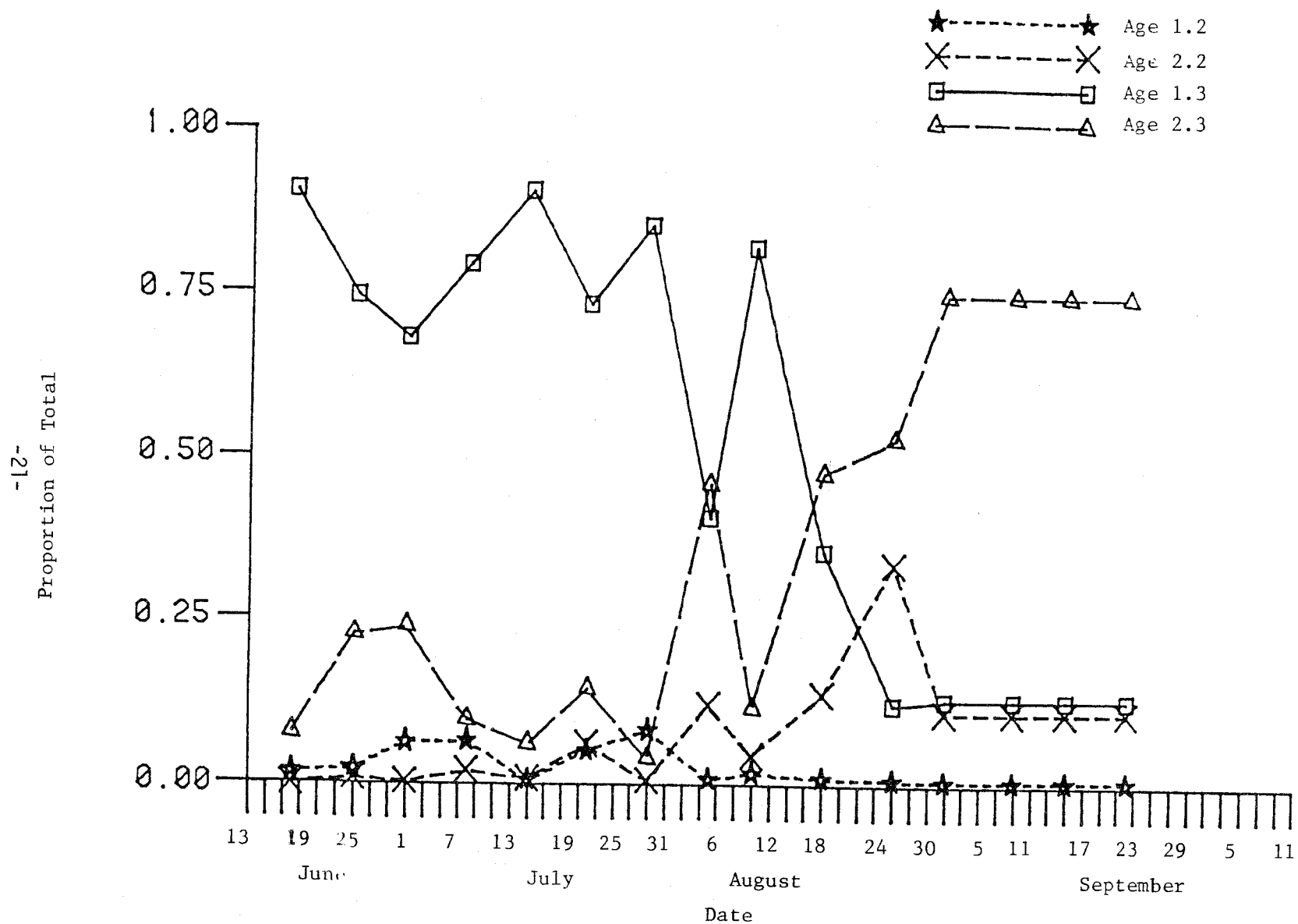


Figure 4. The percent of period catch samples composed of the principal age classes, Lynn Canal, 1981.

confidence intervals for the age class specific estimates are of special concern because they establish the power of the analysis.

Summary Statistics for Scale Measurements:

The mean values and standard deviations of the scale variables computed for Chilkat and Chilkoot Lake sockeye salmon taken in previous years and used in the analysis are summarized in Table 9. The most obvious difference in these measurements is that Chilkat Lake fish show considerably more growth in their first freshwater year.

Variable Selection:

Frequency plots of the scale measurement variables showed that 8 of the 33 variables were not normally distributed and we excluded them from subsequent analysis. The eight variables were SIX1, EIGHT1, LMAX1, FOUR2, SIX2, EIGHT2, LMIN2, and LMIN3.

The variables selected by the stepwise procedure and their order of selection was ID1, LMIN1, MIN1, FOUR1, MAX1, and TWO3. Comparison of the accuracy of models which included only the first variable selected, the first two selected, and so forth (Table 10) showed that no appreciable increase in accuracy was obtained after the first variable (ID1) was entered into the model and we, therefore, limited the model to use this variable exclusively. Limiting the variables used to ID1 resulted in reduced time required to digitize each scale and significantly decreased the time required to provide stock composition estimates during the fishing season.

The jackknifed classification accuracy of 98.3% for a model with a single variable is extremely high and contributed significantly to the narrow confidence intervals of subsequent age class specific stock composition estimates.

Age Class Specific Stock Composition Estimates:

The age class specific stock composition estimates based on scale pattern analysis of age 1.3 sockeye salmon sampled from the commercial catch (Table 11) indicates that Chilkoot Lake fish were more abundant than Chilkat Lake fish early in the run but that their contribution decreased through time. One must, however, consider the contribution of other age classes to obtain a complete picture of the abundance trends, these data are summarized in the following section.

Catch Apportionment:

The harvest of 93,323 sockeye salmon was comprised of 44,367 Chilkoot Lake fish and 48,956 Chilkat Lake fish (Table 12). The temporal pattern of the catch for each system is shown in Figure 5. The weekly harvest during the period 15 June through 8 July was relatively low and composed of approximately equal numbers of fish originating from each system. Catches of Chilkoot Lake fish were at their highest level during the period 13 - 29 July. The number of Chilkat Lake fish also increased during this time but catches were only about half that of Chilkoot Lake fish. During the period 3 - 5 August catches of Chilkat Lake fish remained relatively high while catches of Chilkoot Lake

Table 9. Mean values and standard deviations of scale pattern variables.

Variable	Chilkoot		Chilkat	
	Mean	Standard Deviation	Mean	Standard Deviation
TWO1	28.14	5.62	39.57	6.75
FOUR1	41.92	7.60	64.74	8.39
MAX1	20.23	5.07	26.64	5.05
MIN1	5.09	1.08	5.50	1.29
LMIN1	4.16	1.72	10.87	2.42
NC1	6.67	1.64	13.18	2.13
ID1	61.12	13.33	146.23	22.48
NCH1	1.88	0.99	4.27	1.09
TWO2	18.90	3.41	20.20	5.11
MAX2	13.45	1.94	13.08	2.85
MIN2	7.78	1.60	8.37	1.79
LMAX2	4.02	1.97	2.65	1.69
NC2	6.04	1.64	3.92	2.99
ID2	63.90	19.11	42.77	43.37
NCH2	2.74	0.93	1.54	1.42
TWO3	28.17	4.44	28.42	5.93
FOUR3	58.46	7.11	59.95	9.55
SIX3	90.21	9.13	92.48	12.49
EIGHT3	121.99	11.51	125.45	16.13
MAX3	21.01	2.58	21.86	3.29
MIN3	9.25	1.57	8.53	1.63
LMAX3	9.35	4.82	8.30	4.78
NC3	24.71	2.88	25.24	3.54
ID3	361.60	42.22	372.64	51.54
NCH3	11.16	1.32	11.50	3.71

Table 10. Jackknifed classification accuracy of sequential linear discriminant functions.

Step	Variable Entered	Overall Classification Accuracy	Percent Chilkoot Correctly Classified	Percent Chilkat Correctly Classified
1	ID1	98.3	100.0	96.8
2	LMIN1	97.5	100.0	95.2
3	MIN1	97.9	100.0	96.0
4	FOUR1	98.3	100.0	96.8
5	MAX1	98.3	100.0	96.8
6	TWO3	98.3	100.0	96.8

Table 11. Age class specific stock composition estimates and 90% confidence coefficients calculated from scale pattern analysis of age 1.3 sockeye salmon in the Lynn Canal (District 15) commercial fishery, by period, 1981.

Period	Chilkoot	Chilkat
6/15 - 6/18	0.644 ± 0.068	0.356 ± 0.068
6/22 - 25	0.651 ± 0.066	0.349 ± 0.066
6/29 - 7/1	0.566 ± 0.085	0.434 ± 0.085
7/6 - 8	0.638 ± 0.082	0.362 ± 0.082
7/13 - 15	0.804 ± 0.067	0.196 ± 0.067
7/20 - 22	0.731 ± 0.075	0.269 ± 0.075
7/27 - 29	0.824 ± 0.064	0.176 ± 0.064
8/3 - 8/5	0.628 ± 0.082	0.372 ± 0.082
8/10 ¹	0.914 ± 0.038	0.086 ± 0.038
8/17 - 18	0.929 ± 0.057	0.071 ± 0.057
8/24 - 8/26	0.311 ± 0.013	0.689 ± 0.013
8/31 - 9/2	0.437 ± 0.181	0.563 ± 0.181
9/7 - 9/9 ²	0.437 ± 0.181	0.563 ± 0.181
9/14 - 15 ²	0.437 ± 0.181	0.563 ± 0.181
9/21 - 22 ²	0.437 ± 0.181	0.563 ± 0.181

¹ Fishing patterns and deliveries to tenders precluded our ability to obtain a random sample of the entire catch. Because we were unable to determine the catch from each area we pooled the data to obtain this estimate.

² No samples collected, data collected on the period 8/31-9/2 was used.

Table 12. Stock composition estimates of sockeye salmon catches in Lynn Canal (District 15) by age class and period, 1981.

Period	System	1.2		2.2		1.3		2.3		Other		Total	
		%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
6/15-6/18	Chilkoot	83.3	59	0	0	64.4	2,313	2.9	9	0	0	60.0	2,381
	Chilkat	16.7	12	0	0	35.6	1,278	97.1	297	0	0	40.0	1,587
	Total	100.0	71	0	0	100.0	3,591	100.0	306	0	0	100.0	3,968
6/22-6/25	Chilkoot	83.6	79	0	0	65.1	2,002	3.0	28	0	0	50.9	2,109
	Chilkat	16.4	16	100.0	37	34.9	1,074	97.0	903	0	0	49.1	2,030
	Total	100.0	95	100.0	37	100.0	3,076	100.0	931	0	0	100.0	4,139
6/29-7/1	Chilkoot	78.0	186	0	0	56.6	1,428	2.1	19	42.0	25	44.6	1,658
	Chilkat	22.0	52	100.0	15	43.4	1,095	97.9	862	58.0	34	55.4	2,058
	Total	100.0	238	100.0	15	100.0	2,523	100.0	881	100.0	59	100.0	3,716
7/6-7/8	Chilkoot	82.8	239	0	0	63.8	2,216	2.8	12	50.0	52	57.5	2,519
	Chilkat	17.2	50	100.0	92	36.2	1,257	97.2	413	50.0	53	42.5	1,865
	Total	100.0	289	100.0	92	100.0	3,473	100.0	425	100.0	105	100.0	4,384
7/13-15	Chilkoot	91.8	67	0	0	80.4	8,811	6.3	47	69.5	177	74.9	9,102
	Chilkat	8.2	6	100.0	109	19.6	2,148	93.7	706	30.5	78	25.1	3,047
	Total	100.0	73	100.0	109	100.0	10,959	100.0	753	100.0	255	100.0	12,149
7/20-7/22	Chilkoot	88.1	625	0	0	73.1	7,157	4.3	83	60.2	72	59.3	7,937
	Chilkat	11.9	84	100.0	829	26.9	2,634	95.7	1,843	39.8	48	40.7	5,438
	Total	100.0	709	100.0	829	100.0	9,791	100.0	1,926	100.0	120	100.0	13,375
7/27-7/29	Chilkoot	92.7	1,086	0	0	82.4	9,797	7.1	40	72.2	181	79.6	11,104
	Chilkat	7.3	86	100.0	84	17.6	2,092	92.9	518	27.8	70	20.4	2,850
	Total	100.0	1,172	100.0	84	100.0	11,889	100.0	558	100.0	251	100.0	13,954
8/3-8/5	Chilkoot	82.1	58	0	0	62.8	2,014	2.7	98	48.4	23	27.8	2,193
	Chilkat	17.9	13	100.0	956	37.2	1,193	97.3	3,521	51.6	24	72.2	5,707
	Total	100.0	71	100.0	956	100.0	3,207	100.0	3,619	100.0	47	100.0	7,900

-Continued-

Table 12. Stock composition estimates of sockeye salmon catches in Lynn Canal (District 15) by age class and period, 1981 (continued).

Period	System	1.2		2.2		1.3		2.3		Other		Total	
		%	Number	%	Number	%	Number	%	Number	%	Number	%	Number
8/10	Chilkoot	96.7	47	0	0	91.4	1,942	15.2	47	0	0	78.5	2,036
	Chilkat	3.3	2	100.0	117	8.6	183	84.4	257	0	0	21.5	559
	Total	100.0	49	100.0	117	100.0	2,125	100.0	304	0	0	100.0	2,595
8/17-8/18	Chilkoot	97.3	34	0	0	92.9	966	17.7	247	87.9	60	44.4	1,307
	Chilkat	2.7	1	100.0	407	7.1	74	82.3	1,149	12.1	8	55.6	1,639
	Total	100.0	35	100.0	407	100.0	1,040	100.0	1,396	100.0	68	100.0	2,946
8/24-8/26	Chilkoot	55.1	95	0	0	31.1	731	0.7	74	20.0	35	4.9	935
	Chilkat	44.9	78	100.0	6,452	68.9	1,619	99.3	10,037	80.0	138	95.1	18,324
	Total	100.0	173	100.0	6,452	100.0	2,350	100.0	10,111	100.0	173	100.0	19,259
8/31-9/2	Chilkoot	67.9	18	0	0	43.7	188	30.1	757	30.1	8	28.9	971
	Chilkat	32.1	9	100.0	366	56.3	242	64.9	1,755	69.9	19	71.1	2,391
	Total	100.0	27	100.0	366	100.0	430	100.0	2,512	100.0	27	100.0	3,362
9/7-9/9	Chilkoot	67.9	6	0	0	43.7	62	1.3	11	30.1	3	7.3	82
	Chilkat	32.1	3	100.0	122	56.3	81	98.7	827	69.9	6	92.7	1,039
	Total	100.0	9	100.0	122	100.0	143	100.0	838	100.0	9	100.0	1,121
9/14-9/15	Chilkoot	67.9	2	0	0	43.7	20	1.3	3	30.1	1	7.3	26
	Chilkat	32.1	1	100.0	39	56.3	26	98.7	264	69.9	2	92.7	332
	Total	100.0	3	100.0	39	100.0	46	100.0	267	100.0	3	100.0	358
9/21-9/22	Chilkoot	67.9	1	0	0	43.7	5	1.3	1	30.1	0	7.2	7
	Chilkat	32.1	0	100.0	11	56.3	7	98.7	71	69.9	1	92.8	90
	Total	100.0	1	100.0	11	100.0	12	100.0	72	100.0	1	100.0	97
Total	Chilkoot		2,602		0		39,652		1,476		637		44,367
	Chilkat		413		9,636		15,003		23,423		481		48,956
	Total		3,015		9,636		54,655		24,899		1,118		93,323

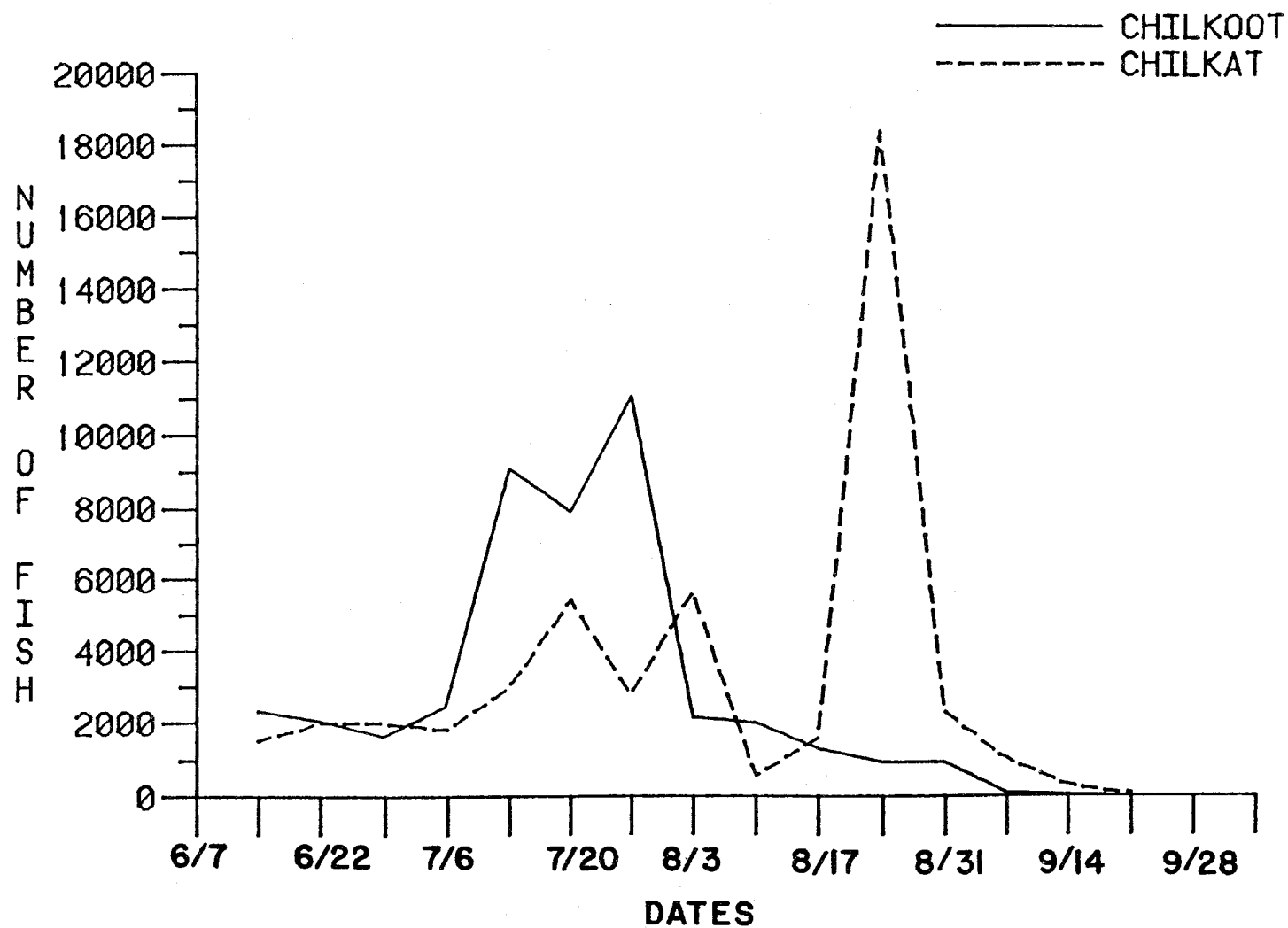


Figure 5. The catch of Chilkoot and Chilkat Lake sockeye salmon in the Lynn Canal drift gillnet fishery, by period, 1981.

fish dropped. Catches of Chilkoot Lake fish showed a continual and steady decline throughout the remainder of the fishing season. Catches of Chilkat Lake fish were highest during the period 24 - 26 August, declined sharply during the catch of 31 August through 2 September, and remained low during the remainder of the season.

Run Summary:

The total return of sockeye salmon of Chilkoot Lake origin was 127,739 of which 44,367 were caught and 83,372 escaped to spawn (Table 13). The exploitation rate for this run was 0.35. Age composition data shows that the exploitation rate was relatively constant within age classes except for age 1.2 fish which experienced a significantly lower exploitation rate of 0.20.

The total return of sockeye salmon of Chilkat Lake origin was 133,045 of which 48,956 were harvested and 84,089 escaped to spawn (Table 13). The exploitation rate for this run was 0.37. Exploitation rates between age classes varied considerably, the rates by age class were: age 1.2, 0.17; age 2.2, 0.53; age 1.3, 0.29; and age 2.3, 0.39.

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Andrew McGregor and Benjamin Van Alen provided valuable assistance in data collection and summarization. Mr. Gary Finger's and Dr. John Clark's assistance in editing was appreciated.

Table 13. Catch, escapement, and total return of sockeye salmon to Lynn Canal (District 15) by age class and system, 1981.

System			1.2	2.2	1.3	2.3	Other	Total
Chilkoot	Catch	Numbers	2,602	0	39,652	1,476	637	44,367
		Percent	5.9		89.4	3.3	1.4	100.0
	Escapement	Numbers	10,451	0	71,312	1,225	384	83,372
		Percent	12.5		85.5	1.5	0.5	100.0
	Total Run	Numbers	13,053	0	110,964	2,701	1,021	127,739
		Percent	10.2		86.9	2.1	0.8	100.0
Chilkat	Catch	Numbers	413	9,636	15,003	23,423	481	48,956
		Percent	0.8	19.7	30.6	47.9	1.0	100.0
	Escapement	Numbers	2,071	8,613	35,920	37,173	312	84,089
		Percent	2.5	10.2	42.7	44.2	0.4	100.0
	Total Run	Numbers	2,484	18,249	50,923	60,596	793	133,045
		Percent	1.9	13.7	38.3	45.5	0.6	100.0

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